OEM

User manual

LEGGI E CONSERVA QUESTE ISTRUZIONI

READ AND SAVE THESE INSTRUCTIONS

CAREL

Technology & Evolution

We want you to save time and money!
We assure you that the thorough reading of this manual will guarantee proper installation and safe use of the described product.

IMPORTANT WARNINGS

BEFORE INSTALLING OR HANDLING THE APPLIANCE, PLEASE CAREFULLY READ AND FOLLOW THE INSTRUCTIONS AND SAFETY REGULATIONS CONTAINED IN THIS MANUAL AND INDICATED ON THE LABELS ATTACHED TO THE MACHINE.

INSTRUCTION SHEET +050003755 OF THE CP* CONTROL BOARD IS AN INTEGRAL PART OF THIS MANUAL! CAREFULLY KEEP INSTRUCTION SHEET +050003755 TOGETHER WITH THIS MANUAL!

This humidifier produces non-pressurised steam by means of electrodes immersed in the water contained in the cylinder-boiler (hereafter referred to as the **cylinder**). The electrodes pass electric current through water, which, acting as electrical resistance, superheats. The produced steam is used to humidify rooms or industrial processes, by means of special distributors.
As the quality of the water in use affects the evaporation process, the appliance may be supplied with untreated water **as long as it is drinkable and not demineralised** (refer to supply water requirements); the evaporated water is automatically replaced by means of a fill valve.
This appliance has been designed exclusively to humidify rooms directly or in ducts through a distribution system. Installation, use and maintenance shall be carried out according to the instructions contained in this manual.
The environmental conditions and the power supply voltage must comply with the specified values.
Any other use and modification to the appliance not expressly authorised by the manufacturer shall be considered as improper.
Liability for injuries or damage caused by improper use lies exclusively with the user.
Please note that the machine contains live electrical devices and hot surfaces.
All service and/or maintenance operations must be carried out by specialist and qualified personnel aware of the necessary precautions and able to operate properly.
Disconnect the machine from the mains before accessing any internal parts.
The appliance must be installed in compliance with the local regulations in force.
The local safety regulations in force must be applied in all cases.

Disposal of humidifier parts
The humidifier consists of metal and plastic components; all parts must be disposed of in compliance with the local regulations concerning waste disposal.

Materials warranty: 2 years (from the date of production, consumable parts excluded – e.g. the cylinder).

Certification: the quality and safety of Carel's products are guaranteed by the **ISO 9001** certified design and production system, as well as by the CE mark.

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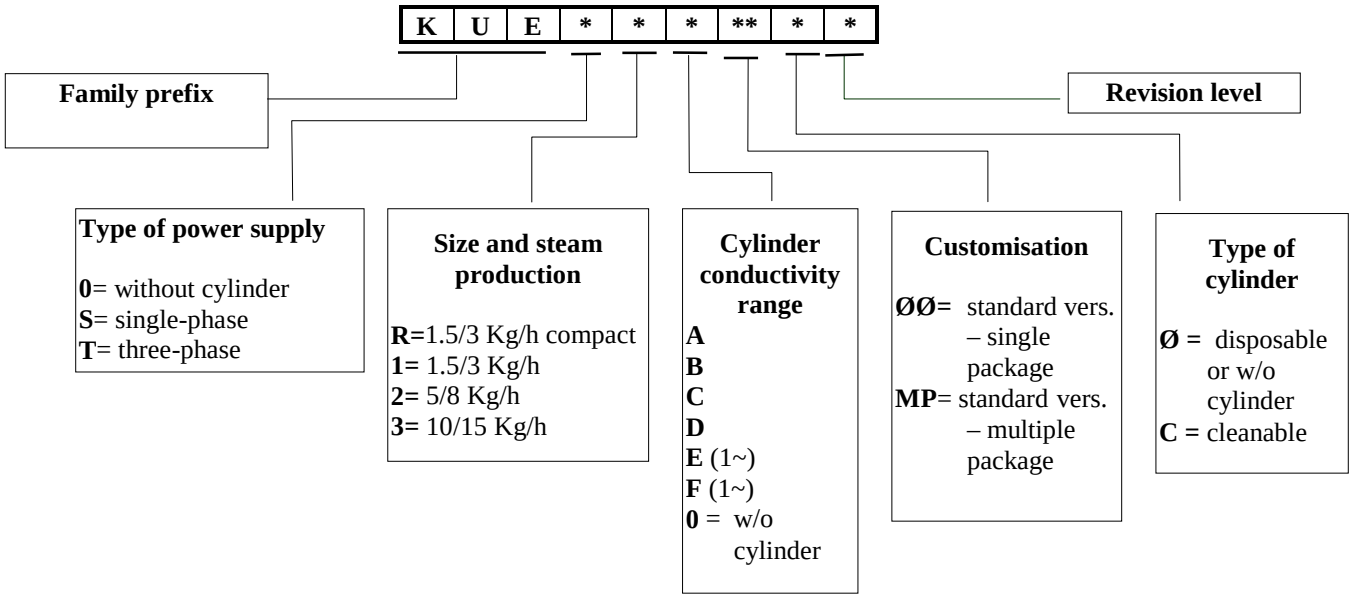
1. MODELS AND DESCRIPTION OF THE COMPONENTS

The code that identifies the humidifier model is made up of 10 characters having the following meaning:



Example:

- KUET3D00C0 = UE OEM KIT with 15 Kg/h steam cleanable three-phase cylinder for standard conductivity, CAREL at revision level 0;
- KUE010MP00 = UE OEM KIT 1.5/3 Kg/h steam - compact - w/o cylinder, with multiple package at revision level 0.

1.1 Description of the components

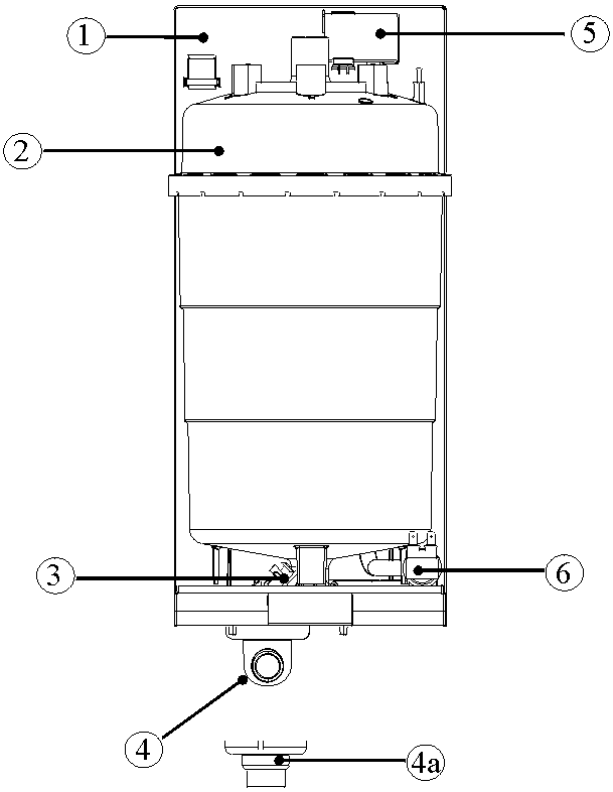


Fig. 1.1.1

no.	description
1	Bearing frame
2	Cylinder
3	Drain solenoid valve
4	90° revolving drain connection
4a	Straight drain connection (supplied)
5	Fill tank + conductivity meter
6	Fill solenoid valve

Tab. 1.1.1

CP* control boards (also refer to instruction sheet +050003755 of the boards)

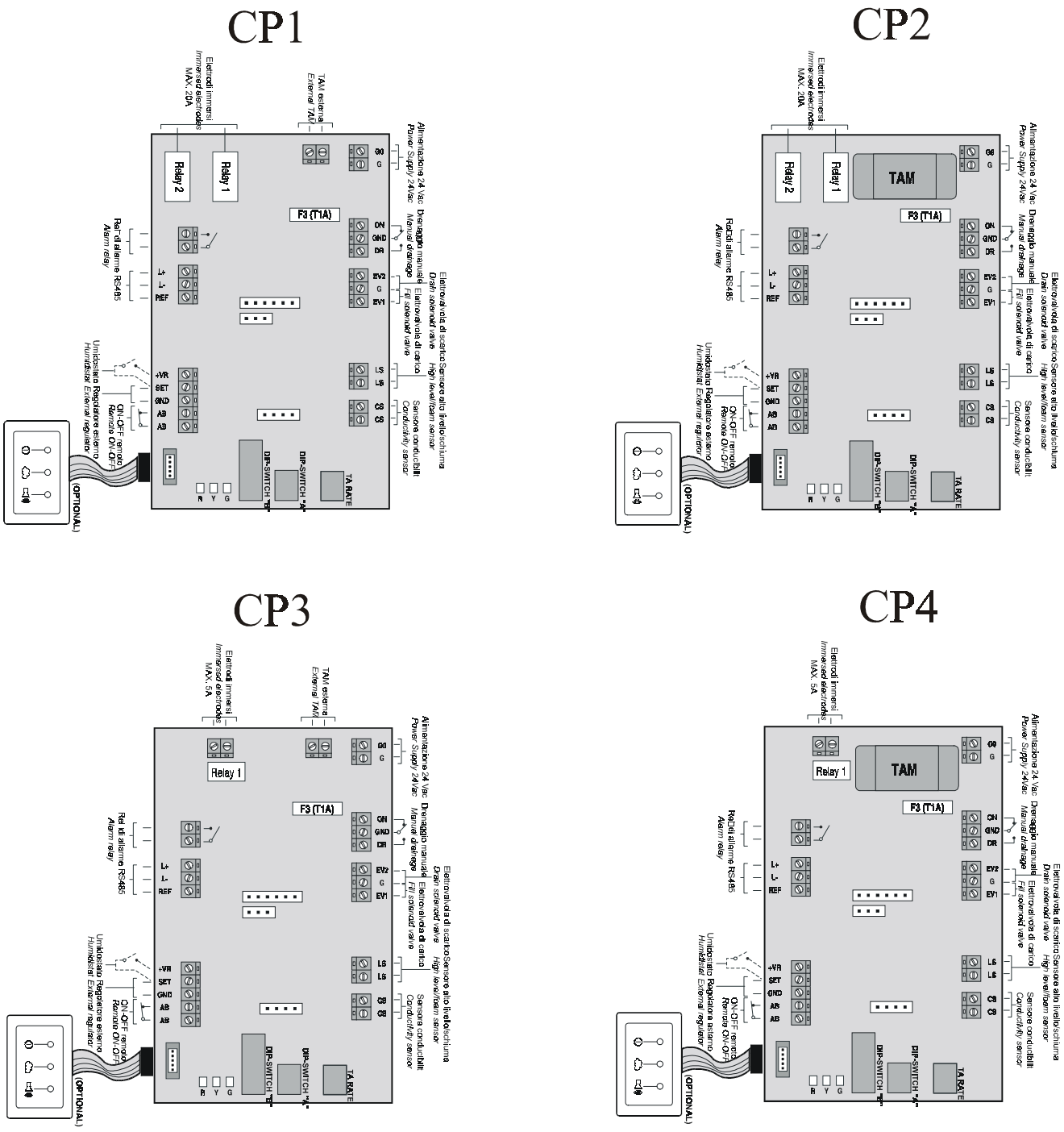


Fig. 1.1.1a.

Key:
CP1: controller for KUE single-phase (KUE*S*) with external TAM
CP2: controller for KUE single-phase (KUE*S*) with built-in TAM
CP3: controller for KUE single/three-phase with external TAM
CP4: controller for KUE single/three-phase with built-in TAM

Fig. 1.1.1b. External TAM (required for CP1* and CP3* boards only)

For the description of Fig. 1.2.2, refer to the following table.

no.	description
1	Fill solenoid valve
2	Flow rate limiting device
3	Supply pipe
4	Fill pipe
5	Overflow pipe
6	Conductivity measuring electrodes
7	Fill tank – overflow device *
8	High level electrodes
9	Steam outlet
10	Electrodes (2/6 in single-phase model, 3/6 in three-phase model)
11	Cylinder casing
12	Bottom filter
13	Drain solenoid valve

Tab. 1.2.1

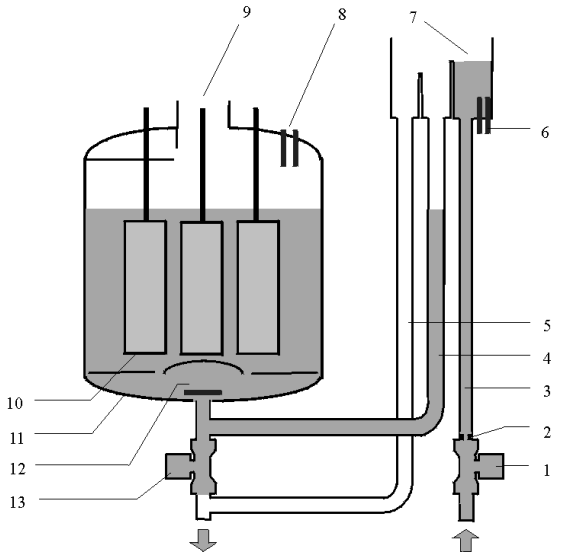


Fig. 1.2.2

* Device used to prevent water overflowing from the fill tank above the safety level (e.g., due to a controller malfunction, fill solenoid valve overflowing or back pressures).

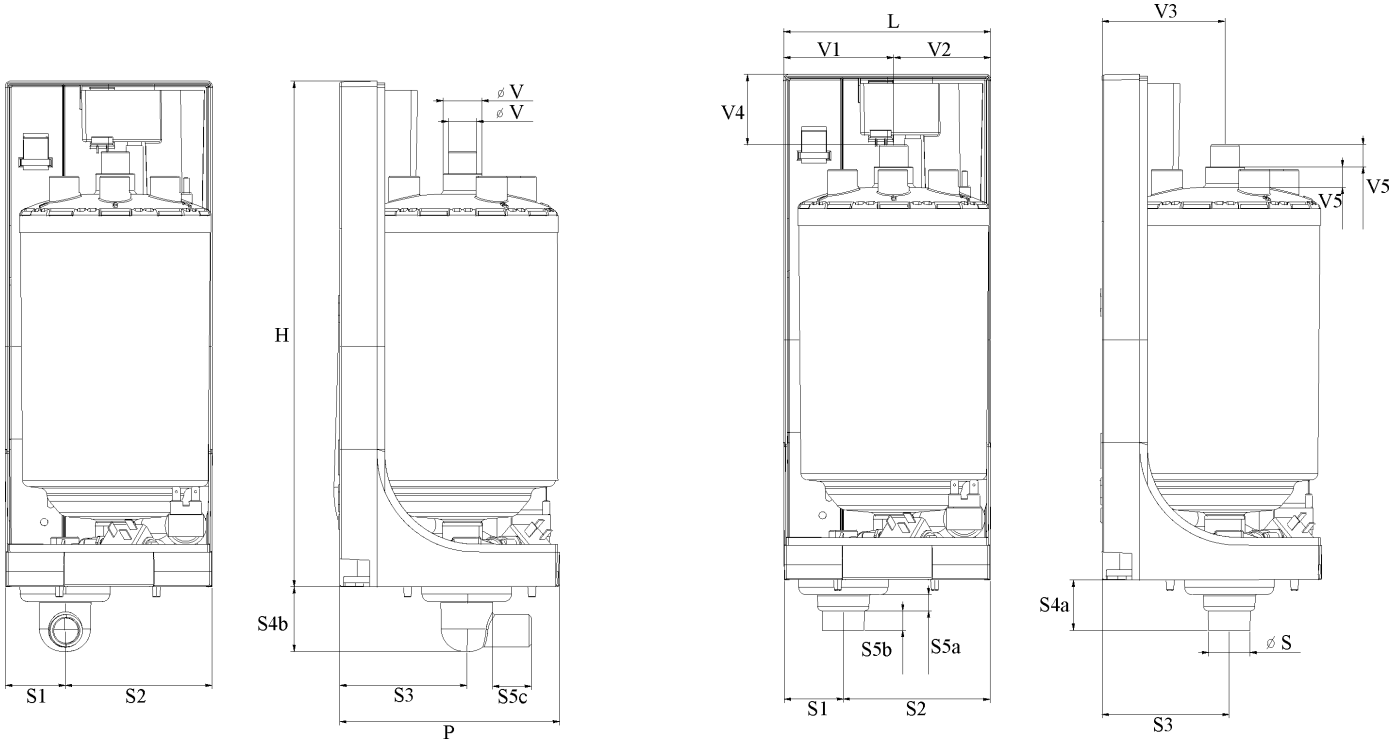
The fill tank is equipped with an overflow diaphragm that discharges the excess water through a special pipe.

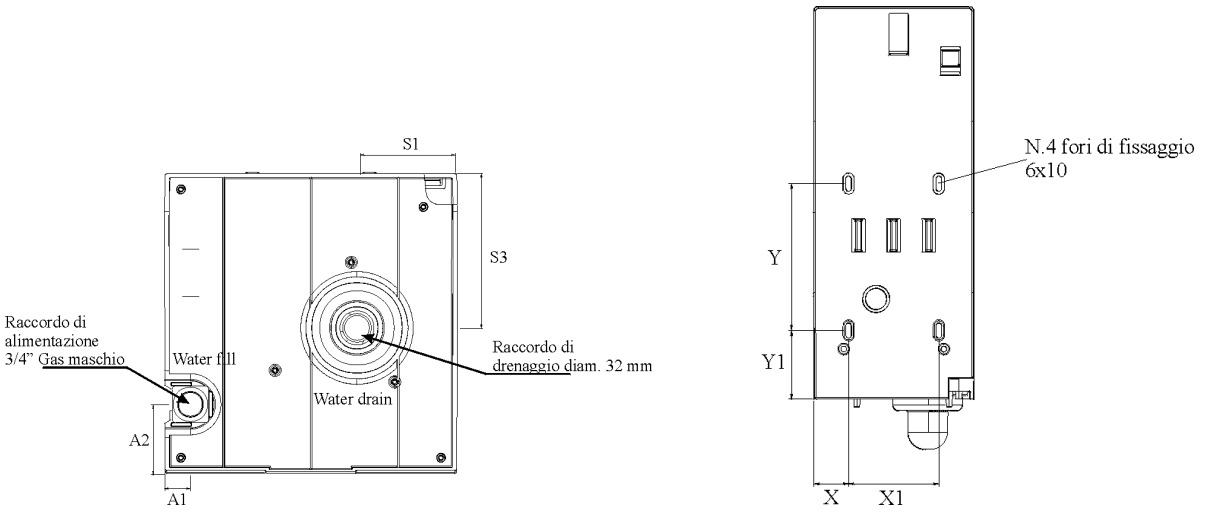
The overflow diaphragm is located in a lower position with respect to the fill one (-40mm) in order to prevent back-flow into the fill pipe.

2. INSTALLATION: dimensions, weights and pipes connection

2.1 Positioning

- To favour steam distribution, position the appliance so as to minimise the length of the steam supply pipe (max 4 mt). The unit has been designed for wall mounting; the wall must be able to support the weight of the uit during mnachine operation.
- The cylinder of the humidifier may reach temperatures above ≥ 60 °C.
- Make sure that the humidifier is level.





Raccordo di alimentazione 3/4 " Gas maschio	*Supply connection 3/4 " Gas male*
Raccordo di drenaggio diam. 32 mm	*Drain connection dia. 32mm*
N. 4 fori di fissaggio 6x10	*No. 4 fastening holes 6x10*

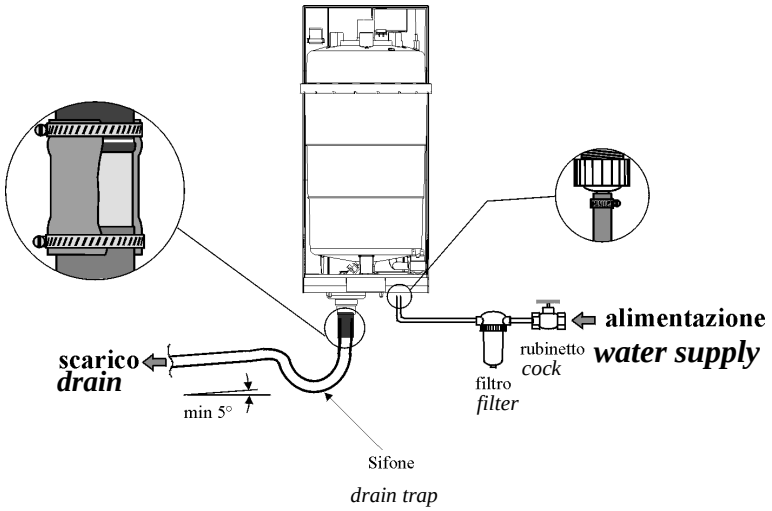
Sizes and Weights

		Models			
		KUESR*	**KUE*1***	**KUE*2***	**KUE*3***
Weights (Kg)	**Empty**	1.2	1.6	2.9	3.5
	Packed	2.0	2.4	3.7	4.3
	Installed	3.7	5.5	8.9	13.8
Dimensions (mm)	**H**	300	391	412	512
	L	160	160	185	225
	P	170	170	220	230
	Ø V	23-30	23-30	30	30
	Ø S	32	32	32	32
	V1	81,5	81,5	93	112.5
	V2	78,5	78,5	92	112.5
	V3	99,5	99,5	124	135
	V4	54	54	20	26
	V5	16-17	16-17	37	37
	S1	46	46	54	77
	S2	114	114	131	148
	S3	98	98	118	118
	S4a-S4b	40-50	40-50	40-50	40-50
	S5a-S5b-S5c	13-15-30	13-15-30	13-15-30	13-15-30
Pipes connection (mm)	**A1**	19.5	19.5	19.5	19.5
	A2	53	53	53	53
Distances (mm)	**X**	36	36	47	74
	X1	90	90	90	99
	Y	146	146	213	316
	Y1	68	68	68	75

The appliance can be either wall-mounted by using the appropriate fastening holes or installed on bracket so that the hydraulic connections can be executed.

2.2 Pipes connection

The installation of the humidifier requires connection to the water supply and drain pipes.



2.3 Drain

	Models			
	KUESR*	**KUE*1***	**KUE*2***	**KUE*3***
Max. drain instant flow rate l/min	~ 4	~ 4	~ 4	~ 4
Drain water connection (mm)	32	32	32	32
Drain pipe min. inside Ø	25	25	25	25

The drain water connection is made using a section of rubber or plastic tubing resistant to 100 °C, with 32 mm suggested inside diameter (compliant with DIN 19535, UNI 8451/8452).
The drain union is suitable for heat seal with polypropylene drain pipes.

IMPORTANT WARNING: the drain pipe must be free, without back pressure and must be equipped with a drain trap downstream of the connection to the humidifier.

2.4 Supply

	Models			
	KUE*R*	**KUE*1***	**KUE*2***	**KUE*3***
Max. supply instant flow rate l/min	0.6	0.6	0.6	1.2
Supply water connection	¾ ”G male	¾ ”G male	¾ ”G male	¾ ”G male
Supply pipe min. inside Ø (rigid or flexible pipe)	6	6	6	6

Tab. 2.4.1

To facilitate installation, use Carel’s flexible pipe code FWH3415000 (¾”G straight + flexible pipe in PVC fitted with flexible stiffening + ¾”G 90°; max 20 bar, max 1,5m) or flexible pipe with 6mm inside diameter and 8mm outside diameter (code 1312350APN can be ordered per meter) and the ¾” G revolving union, either straight (code 9995727ACA) or with 90° elbow (code 9995728ACA), both available on request.

A cut-off cock and a mechanical filter should be installed to trap any solid impurities.

2.5 Checks

Proper hydraulic connection is obtained when the following conditions are met:

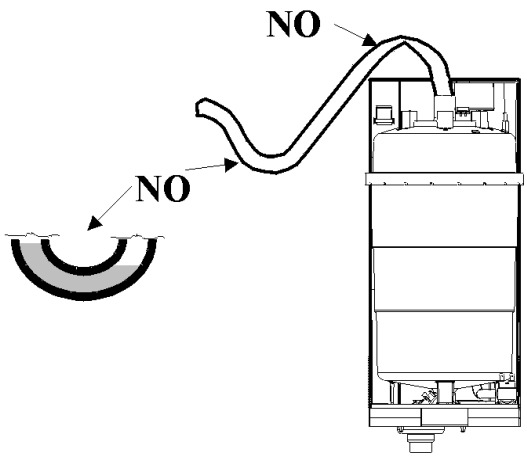
- installation of a cut-off cock in the supply water line;
- presence of a mechanical filter in the supply water line;
- water temperature and pressure within the allowed values;
- drain pipe resistant to 100 °C;
- drain pipe minimum inside diameter corresponding to 25 mm;
- drain pipe minimum slope higher than or equal to 5°;
- **non-conductive** sleeve;
- presence of a drain trap inside the drain pipe.

IMPORTANT WARNING: upon installation completion, drain the supply pipe for approximately 30 minutes by piping the water directly into the drain connection without sending it to the humidifier. This operation allows eliminating any possible residual product that could clog the fill valve and/or produce foam during boiling.

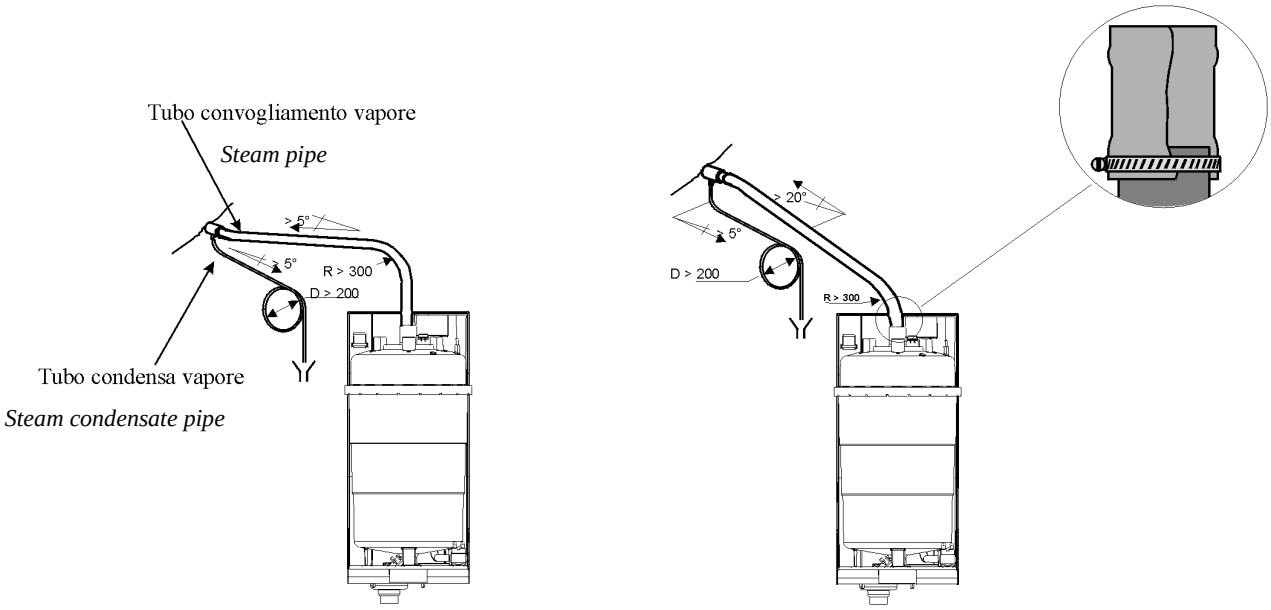
2.6 Installation of the steam pipe and the condensate return pipe

- The humidifier must be connected to the distributor by using a pipe suitable for this purpose, such as Carel’s flexible pipe.
- Make sure that pockets or traps are not forming, as condensate might be trapped into them.
- Make sure that the pipe is not choked due to sharp bends or twisting.
- Use screw clamps to fasten the ends of the pipe.

IMPORTANT WARNING: before starting the unit, remove the PE film wrapping the pipe to allow proper heat exchange.



The pipe may run according to either of the two following solutions:



IMPORTANT WARNING: the length of the steam pipe should not exceed 4 m. To allow the drain trap of the steam condensate pipe to operate properly, it must be filled with water prior to humidifier start-up.

2.7 Water requirements

2.7.1 Supply water

The humidifier must be supplied with aqueduct water having the following requirements:

- pressure between 0.1 and 0.8 MPa (1-8 bar, 14.5-116 PSI);
- temperature between 1 and 40 °C;
- instant flow rate not lower than the fill solenoid valve rated flow rate (refer to table 2.4.1);
- connection type ¾"G male.

LIMIT VALUES FOR <u>MEDIUM-HIGH CONDUCTIVITY</u> SUPPLY WATER OF A HUMIDIFIER WITH IMMERSED ELECTRODES

				LIMITS Min	LIMITS Max
Hydrogen ions	pH	-		7	8.5
Specific conductivity at 20 °C	$\sigma_{R,\ 20\ °C}$	-	µS/cm	300	1250
Total dissolved solids	TDS	-	mg/l	(1)	(1)
Dry residue at 180 °C	R_{180}	-	mg/l	(1)	(1)
Total hardness	TH	-	mg/l $CaCO_3$	100(2)	400
Temporary hardness		-	mg/l $CaCO_3$	60(3)	300
Iron + Manganese		-	mg/l Fe + Mn	0	0.2
Chlorides		-	ppm Cl	0	30
Silica		-	mg/l SiO_2	0	20
Residual chlorine		-	mg/l Cl^-	0	0.2
Calcium sulphate		-	mg/l $CaSO_4$	0	100
Metallic impurities		-	mg/l	0	0
Solvents, diluents, soaps, lubricants		-	mg/l	0	0

(1) Values depending on specific conductivity; in general: TDS ≅ 0.93 * $\sigma_{20;}$ R_{180} ≅ 0.65 * σ_{20} **Tab. 3.1.1**

(2) not lower than 200% of chlorides content in mg/l of Cl^-

(3) not lower than 300% of chlorides content in mg/l of Cl^-

LIMIT VALUES FOR MEDIUM-LOW CONDUCTIVITY SUPPLY WATER OF A HUMIDIFIER WITH IMMERSED ELECTRODES				LIMITS Min	LIMITS Max
Hydrogen ions	pH	-		7	8.5
Specific conductivity at 20 °C	$\sigma_{R,\ 20\ °C}$	-	µS/cm	125	500
Total dissolved solids	TDS	-	mg/l	(1)	(1)
Dry residue at 180 °C	R_{180}	-	mg/l	(1)	(1)
Total hardness	TH	-	mg/l $CaCO_3$	50(2)	250
Temporary hardness		-	mg/l $CaCO_3$	30(3)	150
Iron + Manganese		-	mg/l Fe + Mn	0	0.2
Chlorides		-	ppm Cl	0	20
Silica		-	mg/l SiO_2	0	20
Residual chlorine		-	mg/l Cl^-	0	0.2
Calcium sulphate		-	mg/l $CaSO_4$	0	60
Metallic impurities		-	mg/l	0	0
Solvents, diluents, soaps, lubricants		-	mg/l	0	0

Tab. 3.1.2

(1) Values depending on specific conductivity; in general: TDS ≅ 0.93 * $\sigma_{20;}$ R_{180} ≅ 0.65 * σ_{20}
(2) not lower than 200% of chlorides content in mg/l of Cl^-
(3) not lower than 300% of chlorides content in mg/l of Cl^-
Warning: no relation can be demonstrated between water hardness and conductivity.

IMPORTANT WARNING: **do not treat water with softeners!** This could cause corrosion of the electrodes or the formation of foam, leading to potential operative problems or failures.

Avoid:
1. using well water, industrial water or water drawn from cooling circuits; in general, avoid using potentially contaminated water, either from a chemical or bacteriological point of view;
2. adding disinfectants or corrosion inhibiters to water, as these substances are potentially irritant.

2.8 Drain water

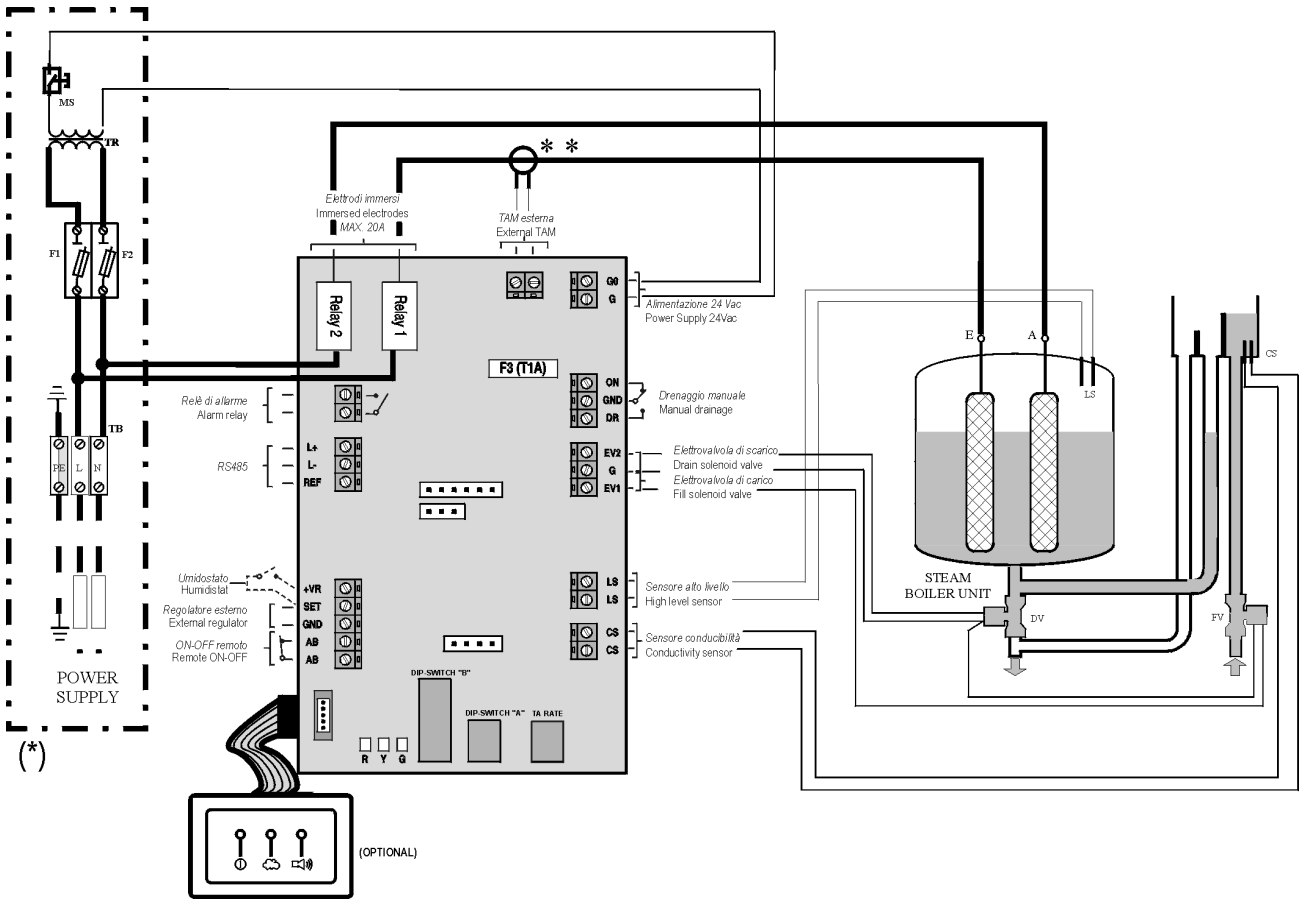
Inside the humidifier, water boils and turns into steam without the addition of any type of substance. As a result, the drain water contains the same substances that are dissolved in the supply water, yet in greater quantity, as a function of the concentration in the supply water and of the set drain cycles. The drain water **can reach 100 °C and ~4 l/min instant flow rate**. As the drain water is not toxic, it can be drained into the white waters system. The drain connection has 32 mm outside diameter.

3. ELECTRICAL CONNECTIONS (with Carel CP control)

Before executing the connections, make sure that the machine is disconnected from the mains.
For further information concerning control, refer to the data sheet cod. +050003755.

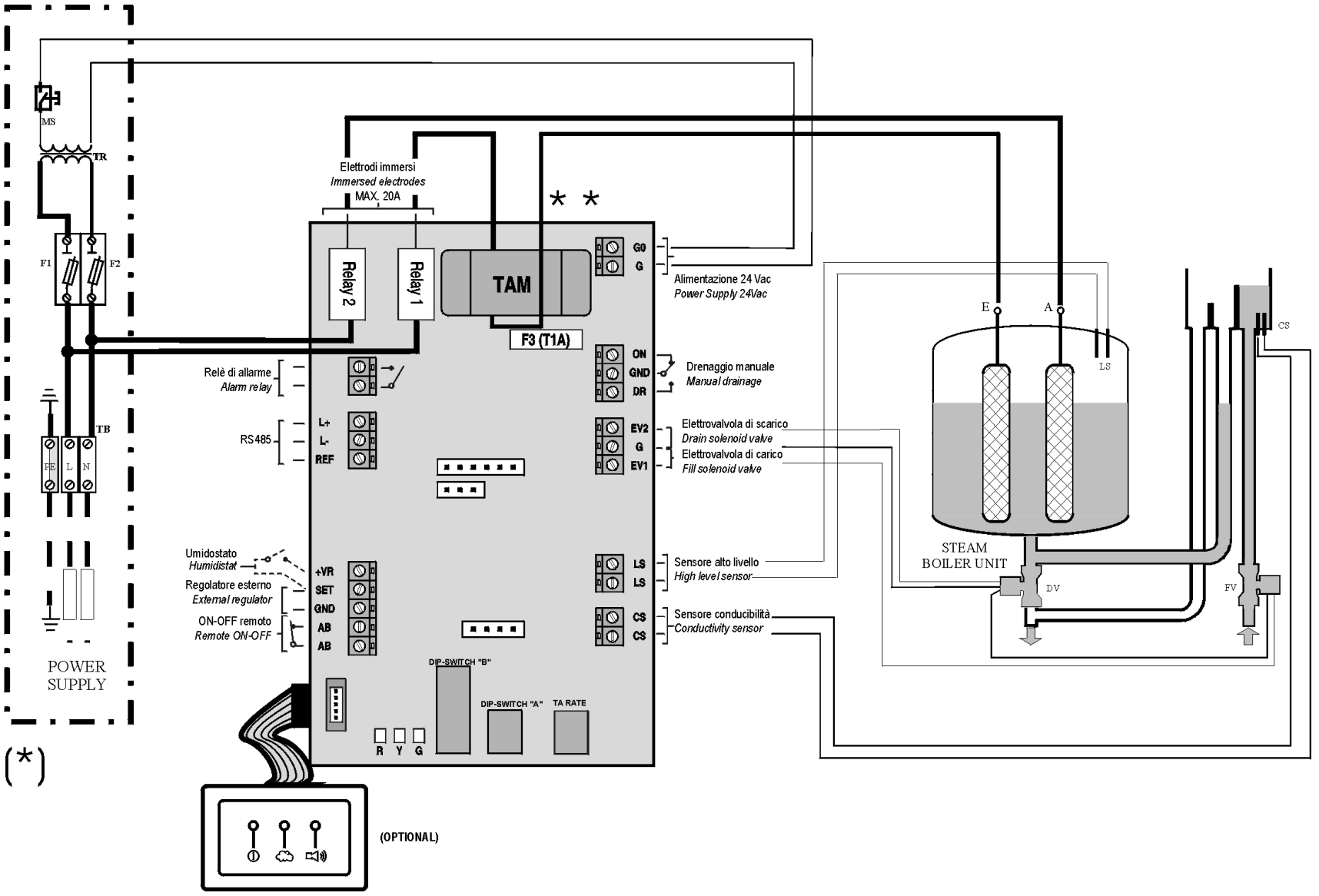
WARNING: the following signal cables must be shielded and laid apart from power cables as by EMC norms:
- external regulator
- remote on/off
- external TAM (CP1 and CP3 only)
- high level sensor
- conductibility sensor

3.1 Single-phase wiring diagram – EXTERNAL TAM (CP1)



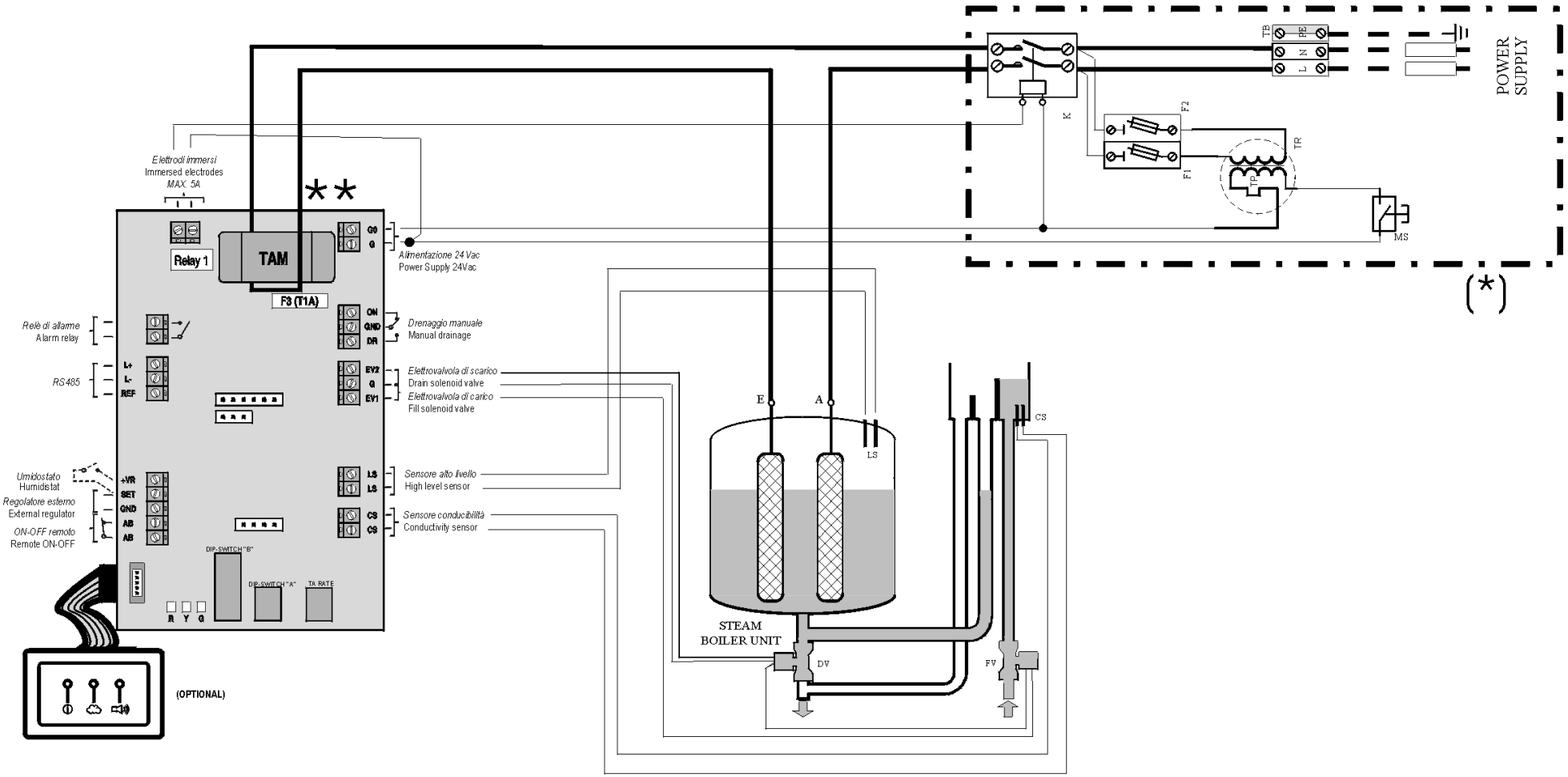
(*) material not supplied by Carel
(**) no. of turns through TAM: refer to data sheet code +050003755

3.2 Single-phase wiring diagram – INTERNAL TAM (CP2)



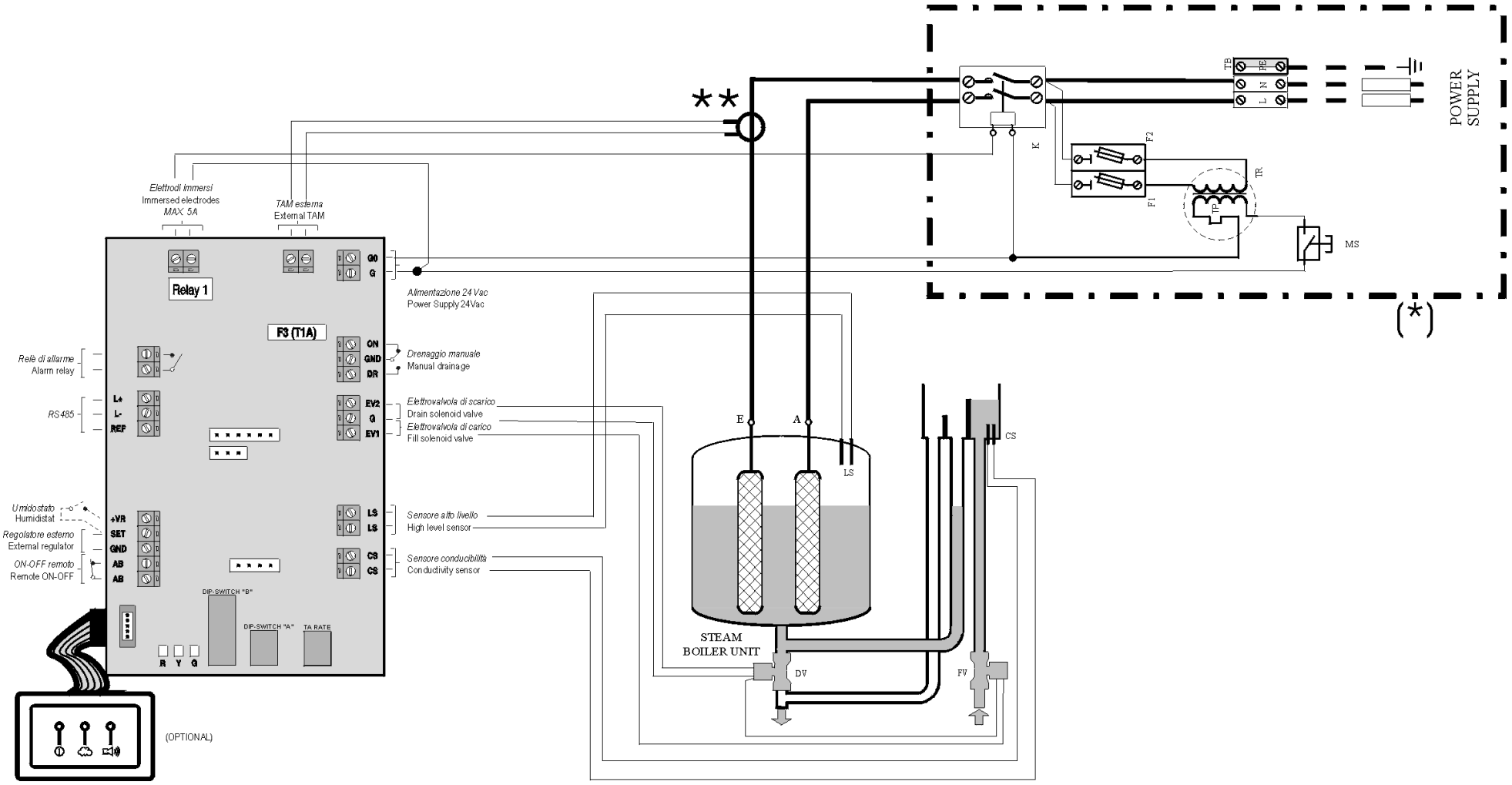
(*) material not supplied by Carel
(**) no. of turns through TAM: refer to data sheet code +050003755

3.3 Single-phase wiring diagram – INT. TAM with remote control switch (CP4)



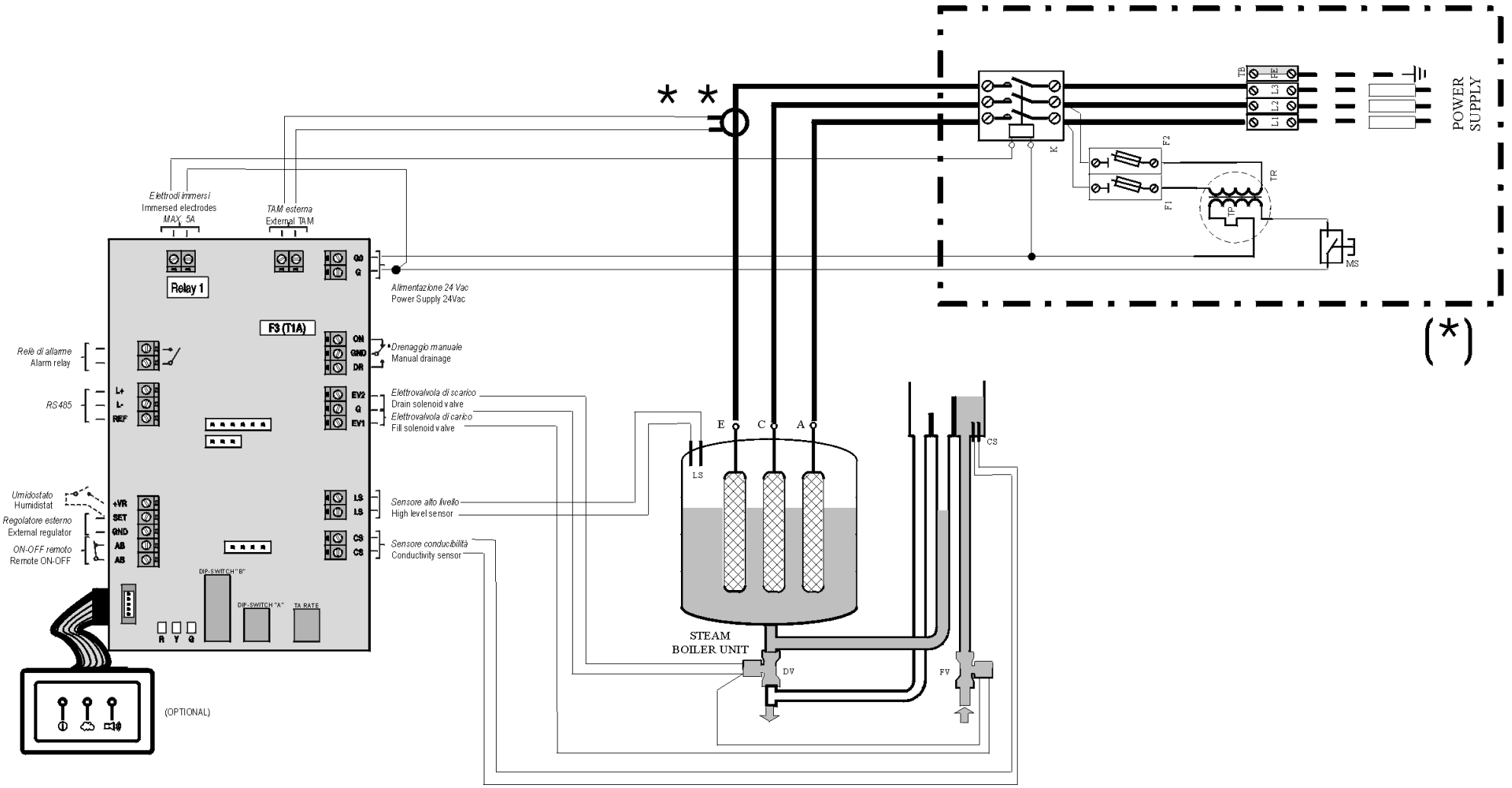
(*) material not supplied by Carel
(**) no. of turns through TAM: refer to data sheet code +050003755

3.4 Single-phase wiring diagram – EXT. TAM with remote control switch (CP3)



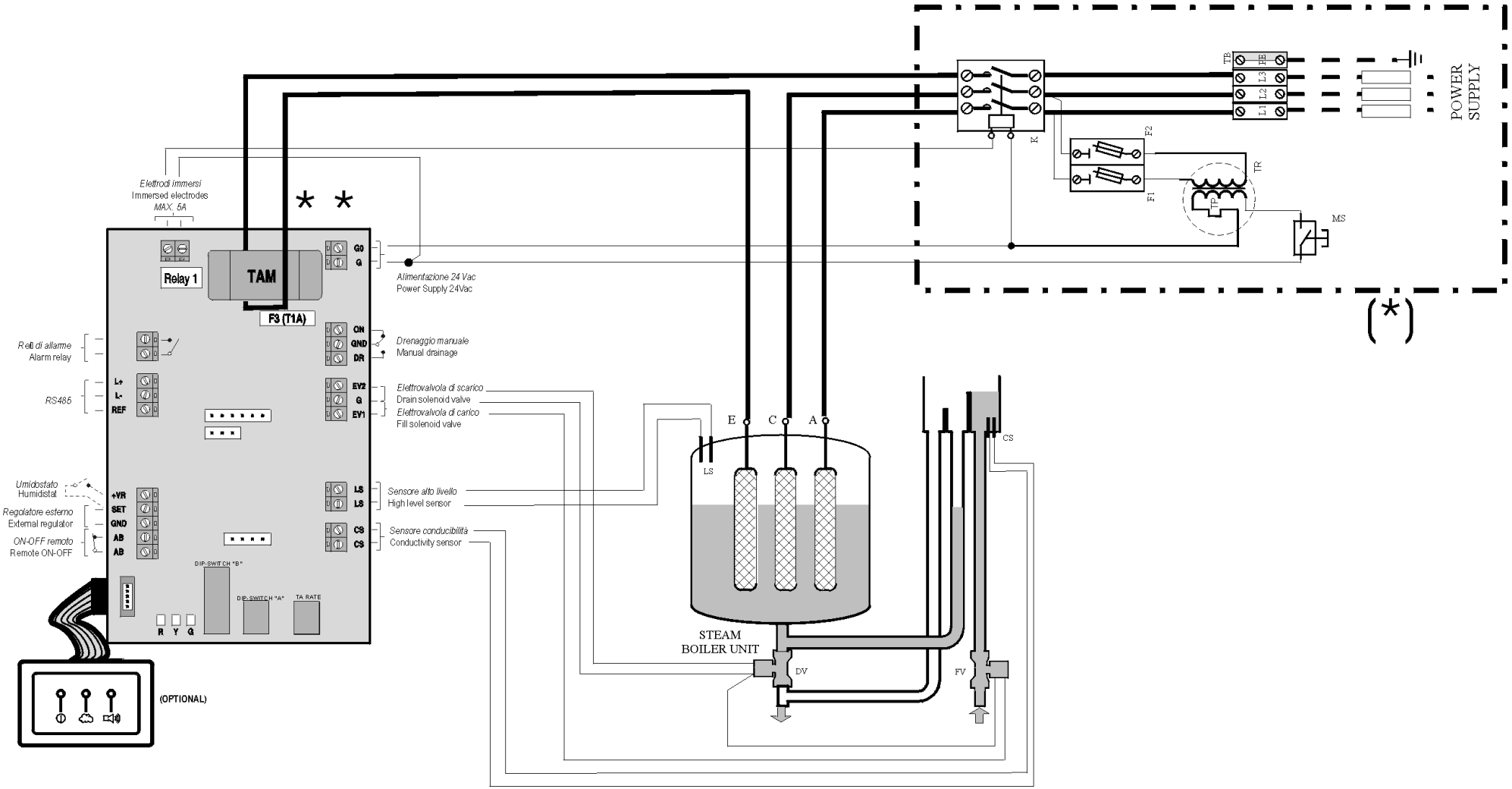
(*) material not supplied by Carel
(**) no. of turns through TAM: refer to data sheet code +050003755

3.5 Three-phase wiring diagram – EXTERNAL TAM (CP3)



(*) material not supplied by Carel
(**) no. of turns through TAM: refer to data sheet code +050003755

3.6 Three-phase wiring diagram – INTERNAL TAM (CP4)



(*) material not supplied by Carel
(**) no. of turns through TAM: refer to data sheet code +050003755

4. START-UP, CONTROL AND SHUT-DOWN

IMPORTANT WARNINGS:

1. **Prior to machine start-up, check that the humidifier is in good condition, that no water leak is present and that the electrical parts are dry.**
2. **Do not power the appliance in case it is damaged or even partially wet!**

Upon installation completion, drain the fill pipe for approximately 30 minutes by piping the water directly into the drain connection without sending it to the humidifier. This operation allows eliminating any possible residual product that could clog the drain valve and produce foam during boiling.

4.1 Preliminary checks

Before starting the humidifier, check that:

- the hydraulic and electrical connections and the steam distribution system have been executed according to the instructions contained in this manual;
- the water cut-off cock to the humidifier is open;
- the line fuses are installed and intact;
- the AB terminals of the CP control board are provided with jumper or connected to the ON/OFF remote contact; also check that the ON/OFF contact is closed;
- the steam outflow pipe is not choked.

4.2 Start-up

4.2.1 Start-up with empty cylinder

This phase will take place automatically when the machine is started: the rated production will be obtained after a certain period has passed (such interval depends considerably on the conductivity of the supply water and may last for some hours).

5. MAINTENANCE AND SPARE PARTS

5.1 Replacing the cylinder

IMPORTANT WARNING: the cylinder might be hot: before touching it, let it cool or use protective gloves.

To intervene on the cylinder:
- completely drain the water contained in the cylinder;
- turn the appliance off and open the mains knife switch (**safety procedure**);
- remove the steam pipe from the cylinder;
- disconnect the electrical connections from the top of the cylinder;
- release the cylinder from the fasteners and lift it for removal;
- assemble the new cylinder on the humidifier operating in reverse order.

Maintenance of the cylinder (refer to cylinders instruction sheet)
The duration of the cylinder depends on different factors, including: complete filling with limestone and/or partial or total corrosion of the electrodes, proper use and dimensioning of the humidifier, working output, water quality, careful and regular maintenance. Due to plastics ageing and electrodes wear, even an openable steam cylinder has a limited duration in time; therefore, it is suggested to replace the cylinder after 5 years or 10,000 working hours.

Important warnings
The humidifier and the cylinder contain live electrical devices and hot surfaces, therefore **all service and/or maintenance operations must be carried out by specialist and qualified personnel aware of the necessary precautions**. Before intervening on the cylinder, make sure that the humidifier is disconnected from the mains; carefully read and follow the instructions contained in this manual. Remove the cylinder from the humidifier only after it has been drained completely. Make sure that the model and power supply voltage of the new cylinder correspond to the data of the replaced cylinder.

Periodical checks
- **After one hour of operation**
  For both the disposable and openable cylinders, check that no significant water leak is present.
- **Every fortnight and no more than 300 working hours**
  For both the disposable and openable cylinders, check that no significant water leak is present and verify cylinder operation and the general conditions of the container. Also check that no arc or spark originate between the electrodes when the machine is operating.
- **Every three months and no more than 1,000 working hours**
  For disposable cylinders, verify cylinder operation, check that no significant water leak is present and replace the cylinder, if required. For openable cylinders, check the container for markedly blackened areas: in case they are present, check the scale condition of the electrodes and, if necessary, replace them together with the O-rings and the cover gasket.
- **Every year and no more than 2,500 working hours**
  For disposable cylinders, replace the cylinder. For openable cylinders, check that no significant water leak is present, verify cylinder operation and the general conditions of the container. Also check the container for markedly blackened areas: in case they are present, replace the electrodes together with the O-rings and the cover gasket.
- **After 5 years and no more than 10,000 working hours**
  For both the disposable and openable cylinders, replace the cylinder.

After extended use or due to the use of water with a high salt content, the solid deposits that form naturally on the electrodes might spread until they cover the cylinder internal wall. In case particularly conductive deposits form, the heat consequently produced might overheat plastic and melt it; in the most severe cases, heat might perforate plastic, causing the water to leak from the cylinder to the tank.
As a precaution, check the quantity of deposits and verify that no deformation or blackening is present on the wall of the cylinder, otherwise replace it.

WARNING: in case of leak, disconnect the appliance before touching the cylinder, as current might be present in water.

5.2 Maintenance of the other hydraulic components

IMPORTANT WARNINGS:

- **Do not use detergents or solvents for plastic components cleaning.**
- **Scale can be removed using a solution with 20% vinegar or acetic acid and then rinsing with water.**

The only steam humidifier component that requires periodical replacement is the **steam production cylinder**.
Replacement is required when the limestone deposits that form inside the cylinder prevent current from flowing properly. In this case, an alarm signal is displayed on the controller. The frequency of this operation depends on the supply water: the more water contains salts or impurities, the more cylinder replacement will be frequent.

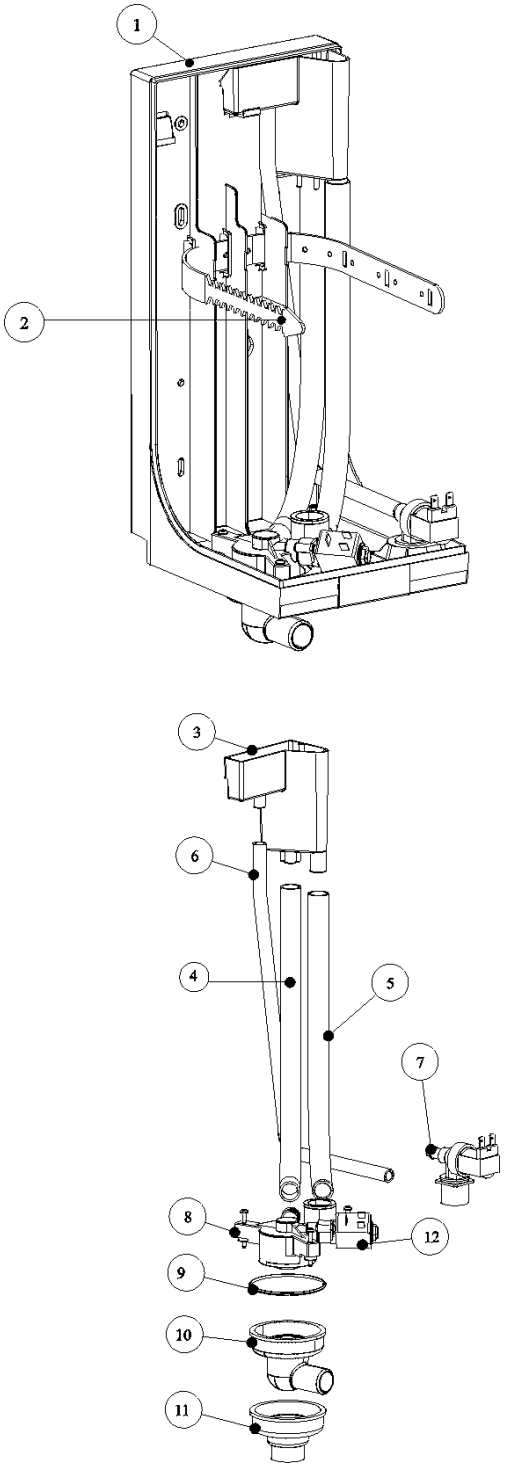


Fig. 5.2.1

no.	description
1	Bearing frame
2	Cylinder lock belt
3	Fill tank + conductivity meter
4	Overflow pipe
5	Cylinder fill pipe
6	Tank fill pipe
7	Fill solenoid valve
8	Fill/drain manifold
9	Gasket
10	90° elbow drain union
11	Straight drain union (supplied)
12	Drain solenoid valve

Tab. 5.2.1

- **Fill solenoid valve** (Fig. 5.2.1, part no. 7)

After disconnecting cables and pipes, remove the solenoid valve and check cleaning of the inlet filter; if required, clean it using water and a soft brush.

- **Fill and drain manifold** (Fig. 5.2.1, part no. 8)

Check that no solid deposit is present inside the cylinder seat; remove impurities, if any.
Check that the O-ring is not damaged or cracked; replace it if necessary.

- **Drain solenoid valve** (Fig. 5.2.1, part no. 12)

Cut power off, remove the coil and disassemble the valve body after having unscrewed the two screws fastening it to the manifold; remove impurities, if any, and rinse.

- **Fill tank + conductivity meter** (Fig. 5.2.1, part no. 3)

Verify that no clog or solid particle is present and check the conductivity measuring electrodes for proper cleaning; remove impurities, if any, and rinse.

- **Supply, fill and overflow pipes** (Fig. 5.2.1, parts no. 4, 5, 6)

Check the pipes for proper clearing and cleaning; remove impurities, if any, and rinse.

IMPORTANT WARNING: after replacing or checking the hydraulic parts, verify the connections for proper execution. Start the machine again and carry out some fill and drain cycles (from 2 to 4); upon cycles completion, check for water leaks, if any, in compliance with the safety procedure.

5.3 Replacing the components

5.3.1 Fuses of the auxiliary circuits

Use fuses with the ratings indicated in tab. 5.3.1.

MODELS	KUES1* or KUESR*	KUET1*	KUET2*	KUET3*
fuses 1- 2	1 A, GL, 10.3 x 38 contained in the fuse carriers on Omega rail			
fuse 3 ***	2 A, T, 5x20			

***: on the CP control board only. **Tab. 5.3.1**

5.4 Spare parts

5.4.1 SINGLE-PHASE humidifiers:

Standard spare parts

Model	KUESR*	KUES1*
Hydraulic part		
Cylinder lock belt (must be cut accordingly along the lines of pre-fracture)	18C499A006	18C499A006
Fill tank + conductivity meter	13C119A003	13C119A003
Fill solenoid valve kit	KITVC00006	KITVC00006
Drain solenoid valve kit	13C476A050	13C476A050
Drain unions kit	KITRAC0000	KITRAC0000
Internal pipes kit *	UEKT00000S	UEKT00000S

*: pipes must be cut at the required size before installation

Non-openable cylinders		
200-230 VAC 1~, conductivity 300-1250 µS/cm	BL0SRF00H0	BL0S1F00H1

Electronic part	
Control board ver. CP	refer to data sheet code +050003755

Tab. 5.4.1.1

Spare parts for special applications

The following spare parts are supplied separately from the standard humidifier, therefore they must be ordered separately.

Model	KUESR*	KUES1*
Non-openable cylinders		
200-230 VAC 1~, conductivity 125-300 µS/cm	BL0SRE00H0	BL0S1E00H1

Tab. 5.4.2.1

5.4.2 THREE-PHASE humidifiers:

Standard spare parts

MODEL	KUET1*	KUET2*	KUET3*		
Hydraulic part					
Cylinder lock belt (must be cut accordingly along the lines of pre-fracture)	18C499A006	18C499A006	18C499A006		
Fill tank + conductivity meter	13C119A003	13C119A003	13C119A003		
Fill solenoid valve kit	KITVC00006	KITVC00006	KITVC00012		
Drain solenoid valve kit	13C476A050	13C476A050	13C476A050		
Drain unions kit	KITRAC0000	KITRAC0000	KITRAC0000		
Internal pipes kit *	UEKT00000S	UEKT00000M	UEKT00000M		

*: pipes must be cut at the required size before installation

Non-openable cylinders					
200-230 VAC 3~, conductivity 350-1250 µS/cm		BL0T2B00H0	BL0T3B00H0		
400 VAC 3~, conductivity 350÷750 µS/cm	BL0T1D00H1	BL0T2C00H0	BL0T3C00H0		
460 VAC 3~, conductivity 350÷1250µS/cm	BL0T1D00H1	BL0T2D00H0	BL0T3D00H0		
575VAC 3~, conductivity 350÷1250 µS/cm		BL0T2D00H0	BL0T3D00H0		

Electronic part	
Control board ver. CP	refer to data sheet code +050003755

Tab. 5.4.3.1

Spare parts for special applications

The following spare parts are supplied separately from the standard humidifier, therefore they must be ordered separately.

MODEL	KUET1*	KUET2*	KUET3*		
Non-openable cylinders					
200÷230 VAC 3~, conductivity 125÷350 µS/cm	BL0T1A00H1	BL0T2A00H0	BL0T3A00H0		
400 VAC 3~, conductivity 125÷350 µS/cm	BL0T1A00H1	BL0T2B00H0	BL0T3B00H0		
400 VAC 3~, conductivity 750÷1250 µS/cm	BL0T1D00H1	BL0T2D00H0	BL0T3D00H0		
460 VAC 3~, conductivity 125÷350 µS/cm	BL0T1B00H1	BL0T2C00H0	BL0T3C00H0		
575 VAC 3~, conductivity 125÷350 µS/cm		BL0T2C00H0	BL0T3C00H0		

Openable cylinders					
200÷230 VAC 3~, conductivity 125÷350 µS/cm		BLCT2A00W0	BLCT3A00W0		
200÷230 VAC 3~, conductivity 350÷1250 µS/cm		BLCT2B00W0	BLCT3B00W0		
400 VAC 3~, conductivity 125÷350 µS/cm		BLCT2B00W0	BLCT3B00W0		
400 VAC 3~, conductivity 350÷750 µS/cm		BLCT2C00W0	BLCT3C00W0		
400 VAC 3~, conductivity 750÷1250 µS/cm		BLCT2D00W0	BLCT3D00W0		
460/575 VAC 3~, conductivity 125÷350 µS/cm		BLCT2C00W0	BLCT3C00W0		
460/575 VAC 3~, conductivity 350÷1250 µS/cm		BLCT2D00W0	BLCT3D00W0		
Electrodes kit (200÷230 VAC 3~, 125÷350 µS/cm)		KITBLCT2A0	KITBLCT3A0		
Electrodes kit (200÷230 VAC 3~, 350÷1250 µS/cm)		KITBLCT2B0	KITBLCT3B0		
Electrodes kit (400 VAC 3~, 125÷350 µS/cm)		KITBLCT2B0	KITBLCT3B0		
Electrodes kit (400 VAC 3~, 350÷750 µS/cm)		KITBLCT2C0	KITBLCT3C0		
Electrodes kit (400 VAC 3~, 750÷1250 µS/cm)		KITBLCT2D0	KITBLCT3D0		
Electrodes kit (460/575 VAC 3~, 125÷350 µS/cm)		KITBLCT2C0	KITBLCT3C0		
Electrodes kit (460/575 VAC 3~, 350÷1250 µS/cm)		KITBLCT2D0	KITBLCT3D0		
Electrodes gaskets kit		KITBLC2FG0	KITBLC3FG0		

Tab. 5.4.4.1

5.5 Troubleshooting table

PROBLEM	CAUSES	SOLUTIONS
The humidifier does not switch on	1. no electric power; 2. controller connectors inserted improperly; 3. fuses disconnected; 4. transformer faulty	1. check protection device upstream of the humidifier and verify that power supply voltage is present; 2. check connectors for proper insertion in the terminal board; 3. check condition of fuses F1/F2/F3; 4. check that voltage across the transformer secondary winding corresponds to 24 VAC
The humidifier does not start	1. remote ON/OFF contact open (AB – AB terminals) on CP control board 2. control signal not compatible with the set type	1. close ON/OFF contacts (AB – AB terminals) on CP control board 2. check that the external signal is 0-10V
The humidifier loads with water but does not produce steam	1. too high steam delivery back pressures; 2. cylinder inlet filter clogged; 3. limestone inside the supply tank; 4. drain solenoid valve faulty	1. check that the steam delivery pipe is not bent or choked; 2. clean the filter; 3. clean the supply tank; 4. check 24 Vac anomalous presence on the drain solenoid valve and/or replacement of drain solenoid valve
The line magneto-thermal switch enables	1. line magneto-thermal switch under-rated 2. overcurrent to the electrodes	1. check that the **magneto-thermal switch** has been rated for a current value corresponding to at least **1.5 times the rated current** of the humidifier 2. check the operation of the drain solenoid valve, the seal of the fill solenoid valve when it is not excited, drain part of the water and start the system again
The humidifier wets the duct	1. distributor installed improperly (too close to the duct top) or condensate return is hindered; 2. system over-rated; 3. humidifier enabled but duct fan off	1. check the steam distributor for proper installation; 2. decrease steam production set on the control board; 3. check connection of a device (flow switch or differential pressure switch) slaving the humidifier to the ventilation inside the duct (AB – AB terminals) of the CP control board
The humidifier wets the underlying floor	1. supply or overflow hydraulic circuit leaking; 2. steam delivery pipe not properly fastened to the cylinder	1. check the entire hydraulic circuit; 2. check fastening of the clamp on the steam delivery pipe

Tab. 5.5

5.6 Alarms

Refer to data sheet +050003755, which is an integral part of this manual.

6. OPERATING PRINCIPLES, CONTROL AND OTHER FUNCTIONS

6.1 Operating principle

In a humidifier with electrodes, humidity is produced inside a cylinder (boiler) containing water that is heated to and then held at boiling temperature. The evaporated water is automatically replaced with water drawn from the supply network.

The heat required for water boiling is obtained by passing electric current through the cylinder water; this operation can be executed by connecting the electrodes immersed inside the boiler to the electric supply network.

The initial quantity of the flowing current strongly depends on the type of water coming from the supply network. Normally, a recently-started cylinder has low current. With the passing of time, the quantity of the salts contained in the water increases (as a matter of fact, evaporation does not include salts); this feature allows reaching the required current level so that the machine can provide for the required steam quantity.

Under stable operating conditions, the required production level is automatically obtained by controlling the boiler water level. This control allows having higher or lower current levels.

Part of the salts introduced in the water by the automatic refill settles inside the boiler as limestone, contributing to the progressive wear of the cylinder; the remaining salts keep dissolved in the water. In order to prevent excessive salt deposits, some water is periodically and automatically drained and then replaced with renewal water.

6.2 Control principles

The range of humidifiers includes the following control options.

6.2.1 ON/OFF control

Control is of on-off type and is enabled by an external contact that determines the control set-point and differential.

6.2.2 Proportional control

The steam production (quantity per hour) is proportional to the value of a signal Y coming from an external device; the type of signal can be selected – via RS485 through programming – among the following standards: 0-10 V (default), 2-10 V, 0-1 V. The entire range is indicated as BP (proportional band).

The Pmax maximum production, corresponding to the maximum value of the Y external signal, can be programmed between 20% and 100% of the humidifier rated value (dip A3-A4).

The Pmin minimum production is set to 20% of the rated value, with activation hysteresis, given by the hy value, corresponding to 2% of the entire BP range of the Y external signal.

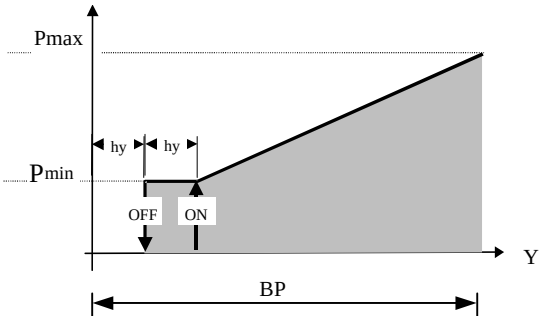


Fig. 6.2.2.1

7. TECHNICAL SPECIFICATIONS

MODEL	KUESR*	KUES1*	KUET1*	KUET2*	KUET2*	KUET3*	KUET3*
Steam							
flow (kg/h)	1.5-3	1.5	1.5-3	5	8	10	15
connection (ϕ mm)	22/30			30			
delivery pressure limits (Pa)	0-500			0-500		0-600	
Supply water							
connection	G¾						
temperature limits (°C)	1-40						
pressure limits (MPa)	0.1–0.8 (1-8 bar, 14.5-116 PSI)						
hardness limits (°fH)	≤ 40						
instant flow rate (l/min)	0.6					1.2	
conductivity range (µS/cm)	125-1,250						
Drain water							
connection (ϕ mm)	32						
typical temperature (°C)	≤100						
instant flow rate (l/min)	~ 4						
Environmental conditions							
operating ambient temperature (°C)	1-50						
operating ambient humidity (% rH)	10-60 (90 not condensing)						
storage temperature (°C)	-10-70						
storage humidity (% rH)	5-95						
index of protection (CEI EN 60529)	IP00						
Electronic control (also refer to CP control board data sheet cod. +050003755)							
type	CP1*, CP2*, CP3*, CP4*						
auxiliary circuits voltage/ frequency (VAC/Hz)	24VAC (-15% TO +10%) / 50-60Hz						
auxiliary circuits maximum power (VA)	30						
signal input	input impedance for 0-10V, 2-10V, 0-1V voltage signals: 15 kΩ						

Electrical ratings: refer to data sheet cod. +050003755.

Carel reserves the right to modify or change its products without prior notice.

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